which gives l in terms of the coefficient of expansion of (ϕ) the cell material, (γ) the glass, and (σ) the material for the blocks. It will be seen from the formula that the shorter the blocks the more equal must be the coefficients of expansion of the glass and cell material, and also the greater the relative distance between the coefficients of expansion of the blocks and cell material.

Dr. Steinheil, as an example, determines the length of these blocks for an objective of 50 cm. aperture, the lenses being composed of common flint silicate marked O.544 in the Jena glass factory, and common crown silicate marked O.1022.

If the material for the blocks used be of zinc (coefficient of expansion $=\sigma=0{\cdot}00002918$), then their length, adopting for the flint glass (544) the value $\gamma=0{\cdot}00000788$ and for the cell material the value $\phi=0{\cdot}00001061$ for their coefficients of expansion, is given by the equation

$$l=\frac{1061-788}{2918-1061}=\frac{273}{1857}=0{\cdot}147.$$

Similarly for the crown glass, the coefficient of which is 0·00000954, we obtain the length of its blocks

$$l=0{\cdot}0576.$$

As the radii of the glass discs are the same and equal to 25 cm., the lengths of the blocks for each of the lenses must be 0·147 × 25 cm. and 0·0576 × 25 cm. or 3·675 cm. and 1·44 cm.

Dr. Steinheil proposes that for each lens three blocks should be used and placed at intervals of 120° round the circumference of the discs, the blocks fitting tightly between the discs and the sides of the cell. It might at first be thought that such tight-fitting as seems necessary could not be exactly enough done, but it is stated that accuracy in the length of the zinc block to 1 mm. can be safely depended on, and the danger of strain by eliminating the disturbances of centering thereby reduced to a minimum.

That this new mounting for object-glasses has many points in its favour cannot be denied, but it is in such questions as these that we must look to the results after the method has been practically applied. Thus, practice would better settle the proper number of blocks for each lens; three seem at first sight somewhat too few, and might lead to local strains due to the weight of the lenses, whereas such strains must be avoided in any sort of cell.

W. J. S. LOCKYER.

NOTES.

WE are requested to state that a volume containing a memoir of the late Dr. Geo. J. Romanes, F.R.S., will be published. Those who possess letters of general interest written by him are requested to forward them to Mrs. Romanes, St. Aldate's, Oxford. The letters will be returned directly their contents have been noted and copies made.

A GRACE of the Senate of the University of Dublin has been passed, conferring the degree of Doctor of Science upon Mr. Daniel Morris, C.M.G., Assistant-Director of the Royal Gardens at Kew.

PROF. KARL GUSSENBAUER, of Prague University, has been appointed to the chair of Surgery at Vienna, in succession to the late Prof. Billroth.

A REUTER telegram states that at a meeting of leading citizens held at Toronto on June 23, it was unanimously decided to invite the British Association to hold the meeting there next year.

THE Council of University College, Liverpool, have appointed Dr. A. M. Paterson to the "Derby" Professorship of Anatomy, and Prof. R. W. Boyce to the chair of Pathology recently endowed by Mr. George Holt.

DR. AUGUSTUS SCHLOESSER, assistant to Prof. Henderson in the chemical department of the Glasgow and West of Scotland Technical College, has been appointed to the Principalship of the Storey Institute, Lancaster, rendered vacant by the resignation of Dr. G. S. Turpin.

A KINDLY and appreciative letter, by Prof. Poulton, F.R.S., on some incidents in the life of the late Prof. Romanes, appeared in the *Times* of June 19. The July number of *Science Gossip* contains an obituary notice of the lamented investigator, together with his portrait.

THE Cracow Academy of Sciences have awarded the Copernicus Prize of five hundred florins, founded by the town of Cracow, to Prof. Louis Birkenmajer, for his work "Sur la temperature des lacs des Tatres." A prize of one thousand francs (Priz Majer) is offered for the best work on "La Climatologie des pays Polonais"; papers to be sent in before December 31, 1896.

A SEVERE earthquake disturbance was experienced at Oran, Algeria, at about one o'clock on the morning of the 19th inst. The duration of the shock is said to have been four seconds.

A SPECIAL meeting of the Chemical Society will be held this evening, at nine o'clock, at the Royal Institution, when Prof. Dewar will lecture on "Phosphorescence at very low temperatures."

THE meeting of the Museums Association, now being held in Dublin, was opened on Tuesday with an address by the President, Dr. Valentine Ball, C.B., F.R.S., on "The Museums of Dublin."

IN the House of Commons on Tuesday, Colonel Howard Vincent asked the Home Secretary whether he had decided to adopt in the Metropolitan and City Police districts, and in the provinces, the recommendations of the committee appointed to inquire into the system of identifying criminals by measurement, invented by M. Bertillon, of Paris, and the finger-print test of Mr. Francis Galton; and, in such case, if, in order to facilitate research into the judicial antecedents of international criminals, the registers of measurements would be kept on the same plan as that adopted with such success in France, as also in other continental countries. In reply, Mr. Asquith said that the recommendations of the committee had been adopted, including the recommendations as to the mode of keeping the register.

IN connection with the Antwerp Exposition, a Congress has been arranged, under the auspices of the Sociéte Royale de Geographie d'Anvers, having for its object the discussion of matters relating to the atmosphere. The Congress will be held on August 16, 17, and 18. The papers will be classified into two sections, one dealing with atmospheric movements, while the other is concerned with aerodynamics. The former section is divided into four parts as follows:—(1) General theory of atmospheric currents and the causes which affect them. (2) Methods of observation at different altitudes. (3) Instruments of observation and for automatic registration. (4) Maps of permanent and of variable atmospheric currents, and a comparison of them with ocean currents. In the aerodynamic section the subjects dealt with will be:—(1) The measurement of the velocity of wind. The action of wind on a plane normal surface and on an inclined surface will be considered, and the friction of air. Experimental apparatus is also included in this division, and the effects of wind on buildings, bridges, towers, &c. Aeroplanes, windmills, and turbines are classified under the motive power of wind, while transport by land, sea, and air are arranged in a sub-group of questions relating to the resisting power of air. The subjects of the second part of the second section are the special application to aerial navigation of data on the resistance of air, and the development of the motors required to render such means of transport an accomplished fact. From this summary it will be seen that the Congress has been organised not only with the idea of bringing together those who are working at the problem of aerial navigation, but also meteorologists, naval architects, and all whose experiences may help to elucidate the matter. The President of the Congress is Lieut. General Wauwermans, and the General Secretary, Chevalier Le Clement de Saint Marcq, Rue du petit Chien, 16, Antwerp. M. Lancaster, of the Brussels Observatory, is the President of Section I., and Captain M. van den Borren, the President of Section II.

EVERYONE will agree that the Marine Biological Association of the United Kingdom has, since the opening of the Laboratory, six years ago, carried out the intentions of its original supporters, which were "to promote researches leading to the improvement of zoological and botanical science, and to an increase of our knowledge as regards the food, life, conditions, and habits of British food-fishes and molluscs." Scientific research, however, is not often generously endowed, hence the Association, like many similar institutions for investigation, has its activity greatly restricted by the need for further financial support. With the idea of showing the truly national importance of the work carried on in the Laboratory at Plymouth, the Association has issued a pamphlet, in which its aims are briefly stated, and a few of the many practical and purely scientific investigations carried out under its auspices are described. It is hoped that this statement will quicken interest in marine biology, and induce benefactors to science to give their support to its representative Association, not only because their assistance will help to extend scientific knowledge, but also because they will be assisting in the development of our sea-fisheries. The following extract from the pamphlet referred to shows how small are the funds of the Association in comparison with those of other establishments having similar objects:—"The income of the Association is derived partly from a grant by the Treasury, partly from the voluntary generosity of public companies and private individuals. The Fishmongers' Company contribute £400 a year to the Association, whilst Her Majesty's Government have given £500 a year in the years 1888-9, 1889-90, 1890-91, and £1000 a year in the years 1891-2, 1892-3, and 1893-4. The total income unfortunately falls considerably short of the amount necessary to place the Laboratory on a properly efficient footing. The purchase and maintenance of a sea-going steam-vessel, by means of which fishery investigations can be extended to other parts of the coast than the immediate neighbourhood of Plymouth, is a most pressing need. The admirable Marine Biological Laboratory at Naples, founded and directed by Dr. Dohrn, and devoted purely to zoology and botany, has cost about £20,000, including steam-launches, &c., whilst it has an annual budget of £7000. The United States Fish Commission receives from its Government more than £70,000 a year, and possesses a perfect fleet of vessels. Its work almost exclusively relates to fisheries. The Scottish Fishery Board is credited in the estimates for 1893-4 with £21,858, which (with the exception of £3000 for pier and harbour works) is granted for fresh and salt water fishery work. The Marine Biological Association, with the twofold aim of promoting pure zoology and scientific fishery investigation, received in 1892-3 only £2199 in all." We trust that the appeal of the Association will result in a large extension of the list of subscribers, so that biological science and the fishing industry may both be benefited.

A RECENT number of the *Comptes Rendus* contains a note, by M. Birkeland, on some recent work done in the late Prof. Hertz's laboratory. It is well known that Hertzian waves when they travel along an iron wire magnetise it transversely, although they only penetrate a very short distance below the surface of the wire. This being so, it was an interesting problem to investigate whether it would be possible to observe in such a wire nodes and loops in the magnetisation. Experimenting in this direction M. Birkeland was led to a negative result, which he attributed to the electrical conductivity of the wire, and hence he was led to experiment, not on cylinders of iron, but on mixtures of finely divided iron and paraffin. He uses a square resonator having each side 60 c.m. long, the opposite side to the spark micrometer being formed into a coil of twelve turns, well insulated from each other. If a cylinder of soft iron is introduced into this coil, the spark length is not changed; a fact which previous experimenters have shown to be due to the screening effect of the induced currents in the superficial layer of the mass of metal. When, however, a cylinder of the mixture of iron and paraffin is introduced into the coil, the spark length may be reduced from 9 m.m. to 0·05 m.m. or to 1/180th of its original value. The effects observed increase as the electrical conductivity of the cylinders diminish, so that the magnetic action of the iron becomes less masked by the conductivity effects. This is well shown by surrounding the cylinder with tin-foil, when the spark regains its original length. When a hollow cylinder of the mixture of iron and paraffin is introduced into the coil, the spark length is much shortened, but the effect is much enhanced when the hollow cylinder is filled by a solid rod. Thus the author finds that the magnetic action is felt through a thickness of 5 m.m. when the mixture contains 25 per cent. of iron, and through 7 m.m. when it contains 10 per cent of iron.

THE Central Meteorological Office of France has just published its *Annales* for the year 1892, consisting of three large quarto volumes. Vol. i. contains a number of memoirs on special subjects, among which, as usual, there is one by M. Fron, on thunderstorms in France during the year. These summaries have been continued for thirty years, and furnish useful data for determining the laws which underlie the formation and propagation of those phenomena. M. Moureaux discusses the observations on terrestrial magnetism at the Parc Saint Maur, and gives curves from the self-recording instruments of the most remarkable disturbances, which were considerable during that year. He also contributes a paper on the magnetic conditions at 100 stations; there are altogether 428 such stations in France; those not yet dealt with will be discussed in subsequent years. The results of phenological observations and the migrations of birds during the years 1881-90 are discussed by M. Angot; this is one of the most comprehensive and complete papers of the kind hitherto published. He also contributes a valuable paper on the results of M. Vallot's first series of observations on the summit of Mont Blanc, made in 1887, and a comparison of the simultaneous observations made at the central office in Paris and on the Eiffel Tower, which confirm the principal results obtained in previous years. Finally, M. Durand-Greville gives a detailed investigation of the connection between squalls and thunderstorms, and has determined some of the phenomena which regularly accompany the formation and propagation of the latter. Vols. ii. and iii. deal respectively with the ordinary observations and with rainfall values at a large number of stations. An important addition to this branch of the work has been made by the publication of the observations made in Senegal, among those referring to stations for various foreign places.

AT the joint meeting of Cornish scientific societies, held at Penzance on June 15, Mr. Howard Fox, the president of the Royal Geological Society of Cornwall, read a paper on "Some Fossils from the Coast Sections in the Parishes of Padstow and St. Mervyn," in which he showed that a hitherto unexamined portion of the North Cornish Coast is Upper Devonian. Mr. G. L. Crick, of the British Museum, recognised amongst the fossils found, Orthoceras, Bactrites, and Goniatites, and determined two species, *Bactrites Budesheimensis* and *Goniatites Simplex*. Both these species occur in Germany in Lower Beds of the Upper Devonian, and both forms are likewise present at a corresponding horizon in the red shales of Saltern Cove, near Torquay. In the same horizon at Trevone several specimens were found of the small bivalve shell *Cardiola retrostriata* (*Cardium palmatum*), also found at Saltern Cove and in the Upper Devonian beds of Budesheim. The occurrence of these characteristic fossils in the Trevone rocks leads to the conclusion that the beds are on the same geological horizon of the lower portion of the Upper Devonian as the Budesheim strata. A portion of a plate of a ganoid fish imbedded in the blue shale of Trevone was recognised by Mr. Smith Woodward as undoubtedly Devonian and belonging to a genus not yet described, distinct from the *Steganodictyum* of Ray Lankester. Remains of Trilobites, apparently species of Phacops, with several corals, viz. Favosites, Amplexus, and Pachypora, were found in the friable cliffs, which also yielded two bivalves not determinable, and a small brachipod, with a minute punctate structure, closely similar to that of the Devonian genera *Centronella* and *Cryptonella*. In the foreshores of the northern part of Constantine Bay a palmate form of coral was found, from which a section was made, and determined by Dr. Hinde to belong to the genus *Pachypora*, but the particular species could not be identified. The fossil which most distinctly characterises this foreshore is a species of Conularia. In surface markings this form, according to Dr. Hinde, differs from all other known species from the Devonian rocks of America and Germany, principally in the marked fineness of the transverse lines, and it probably belongs to a new species.

NEW bread and the hot morning roll, though difficult of digestion, may have some advantages. According to the *British Medical Journal*, Dr. Troitzki, writing in the Russian medical periodical *Vratch*, states that he has found that new and uncut bread contains no micro-organisms, as the heat necessary to bake the bread is sufficient to kill them all. As soon, however, as the bread is cut and is allowed to lie about uncovered, not only harmless but also pathogenic microbes find in it an excellent nutrient medium. White or wheatmeal bread is a better medium than black or rye bread, as the latter contains a greater percentage of acidity. Dr. Troitzki's experiments with pathogenic bacteria gave the following results:—*Streptococcus pyogenes aureus* retains its vitality on the crumb of wheatmeal bread for twenty-eight to thirty-one days, on the crust for twenty to twenty-three days; the bacillus of anthrax (without spores) remains alive on the crumb for thirty to thirty-seven days, and on the crust for thirty-one to thirty-three days; the typhoid bacillus remains active twenty-five to thirty days on the crumb, and twenty-six to twenty-eight on the crust; whilst the bacillus of cholera lives twenty-three to twenty-five or twenty-seven days on both.

A RECENT number of the *Arbeiten a.d. Kaiserlichen Gesundheitsamte* contains an interesting paper, by Dr. Dunbar, on the detection of cholera vibrios in river-water. As many as 1100 samples in all were examined, 855 being abstracted from the river Elbe alone, whilst samples from the Rhine, Weser, Oder, and other rivers were also submitted to the special tests necessary for the isolation of cholera vibrios. The investigations were begun at the beginning of last August, and were continued until the middle of December. Only those vibrios which gave the cholera red reaction were submitted to further cultivation and examination. Dr. Dunbar exercises great caution in the classification of the numerous vibrios he has isolated, and although in all important respects it was impossible to distinguish them from undoubted cholera vibrios, yet he prefers to describe those obtained from the river Elbe as Elbevibrios, those from the river Rhine as Rhinevibrios, those from the river Oder as Odervibrios and those from the river Amstel as Amstelvibrios. Some of these vibrios when cultivated in ordinary peptone broth in the presence of air and at a suitable temperature, gave rise to phosphorescence, a phenomenon which was never obtained with the cholera vibrio; but even this failed to serve as a mark of distinction, for out of 68 cultures in which this characteristic appearance was exhibited, 38 only gave it occasionally, losing this power in some instances and exhibiting it in others. Elbevibrios were detected in the vicinity of Hamburg from July 19 down to November 4; after that date, although samples were daily examined, none were found. But whereas these cholera-like vibrios were not found after November 4 in the running water, they were found more than a month later, on December 19, in the mud at the bottom of the river; the latter, remarks Dr. Dunbar, probably offering them an opportunity of remaining in a dormant condition for considerable periods of time until chance and suitable circumstance enable them to become again redistributed in the stream itself. These Elbevibrios were found on 21 occasions in the tap-water as delivered to the city, and once in this water after passing through a Berkefeld cylinder, which was investigated on 50 successive days.

WE have received part iii. of the *Proceedings* of the Academy of Natural Science of Philadelphia, extending from October to December 1893.

MESSRS. J. WHELDON AND CO., Great Queen Street, W.C., have issued a catalogue of books and papers on microscopic zoology and botany they offer for sale.

THE June number of the *Journal* of the Royal Microscopical Society, just issued, contains the sixth part of Mr. A. D. Michael's "Notes on the Uropodinæ," in addition to the useful summary of current researches relating to zoology, botany, microscopy, &c.

THE "Beginner's Guide to Photography" (Perken, Son and Rayment) is in its fortieth thousand. Evidently the purchasers (and their name is legion) of the cheap cameras with which the market is glutted, appreciate this guide to the methods of the "black art."

To the third edition of his "Epitome of the Synthetic Philosophy" (Williams and Norgate), Mr. F. Howard Collins has added an abridgement of the "Principles of Ethics." The volume thus presents, in a condensed form, the whole of Mr. Spencer's philosophical principles, so far as they have been published.

THE volume of *Proceedings* of the Liverpool Naturalists' Field Club for the year 1893 has been issued. It contains an interesting address by the President, Mr. G. H. Morton, on museums of the past, the present, and the future, accounts of the excursions and evening meetings of the Society, and summaries of the botanical and entomological work done. We regret to note that this Society, like many others in the provinces, is not flourishing, the number of members this year being forty less than last year.

THE Alembic Club Reprints, published by Mr. W. F. Clay, Edinburgh, are handy little volumes enabling a retrospective view to be obtained of scientific researches that have become classical. In No. 6, a copy of which is before us, we have the Bakerian Lecture delivered by Davy before the Royal Society in 1807, and a part of a paper communicated by him to the

Society in the following year. The papers, as is well known, deal with "The Decomposition of the Fixed Alkalies and Alkaline Earths." Priestley's experiments in 1775, which led to the discovery of oxygen, will be reprinted in No. 7, and Scheele's work of 1777 in the same direction will form the contents of No. 8. No. 9 will be made up of reprints of Davy's papers on the elementary nature of chlorine. These three volumes of the series are in the press.

THERE is a certain amount of satisfaction in identifying wild flowers gathered during country rambles. To assist amateur botanists in and near Edinburgh to carry out this kind of determination, Mr. C. O. Sonntag has prepared a little book of handy size, viz. "A Pocket Flora of Edinburgh and the Surrounding Country," and Messrs. Williams and Norgate have published it. Therein will be found, to quote the sub-title, "a collection and full description of all Phanerogamic and the principal Cryptogamic plants, classified after the natural system, with an artificial key and a glossary of botanical terms." It may be doubted whether a student derives any great advantage from the dictionary method of classifying specimens, nevertheless he may be led through such work to higher studies. Another local flora of which we have received a copy is a "Vade-mecum to the Alpine Flora," by L. Schröter and Prof. C. Schröter (London: David Nutt). This book is in its fourth edition. It contains one hundred and seventy coloured representations of Alpine flowers, so that every bit of bloom which beautifies the Swiss mountain-side can be easily identified by tourists without any botanical knowledge whatever. No attempt is made to describe or classify the plants in a systematic manner. Unlike Mr. Sonntag's book, that by Prof. Schröter appeals to the curious tourist rather than the investigating student. The text is in English, French, and German.

THE first edition of Quain's renowned "Dictionary of Medicine" was published in 1882; the second edition was issued by Messrs. Longmans, Green, and Co. last week. For twelve years Sir Richard Quain's comprehensive work has been the standard dictionary of medical knowledge, and the practitioner, teacher, and student alike have put their trust in it. The fact that more than 33,000 copies of this work of reference have been issued in this country and America suffices to show the manner in which the labours of the editor and his eminent staff are appreciated. To bring the book up to the present state of knowledge was a laborious task, for, since the first edition was published, the science and practice of medicine have made enormous progress, and many new developments have occurred. The work had, in fact, to be completely revised, and a large number of new articles had to be prepared. The result of these expansions is that the Dictionary now consists of two volumes, entirely reprinted, while the number of pages have been increased from 1834 to 2518. The editor, and his assistants, Drs. F. T. Roberts and J. Mitchell Bruce, are to be congratulated upon the accomplishment of their task. With the co-operation of numerous members of the medical profession, they have launched their treatise for a second time. We do not doubt that its future career will be as successful as its past.

UNDER the title "Proof Spirit and Fiscal Hydrometry," Mr. John Heywood has published a small book by Dr. B. Derham. The author arraigns the legal definition of proof-spirit, because it depends upon the indications of a certain Sykes' hydrometer. This instrument, and the tables for use with it, are shown to be open to objection. According to Dr. Derham, the proper allowances for variations of the temperature of the hydrometer, and of the spirit stored in bonded warehouses, are not made. Accepting this, it is shown that the Revenue suffers a considerable loss of duty on proof-spirits. In fact, it is asserted that the Revenue estimate, for the yea 1892-93, of the total quantity of proof-spirit, fell short of the true estimate by 186,542 proof-gallons; and that, consequently, the loss sustained was £93,271. And, it may be added, since the funds for technical education came from the wine and spirit duties, Dr. Derham's book would seem to show that the moneys available are less than they ought to be. Thus it appears that the progress of technical instruction is dependent upon the graduations of Sykes' hydrometer, a connection that reminds us of Darwin's story of the relation between cats and clover. Having pointed out the seeming defects in Sykes' system, Dr. Derham develops a new system of hydrometry, and describes a new form of hydrometer for carrying it into effect. His suggestions may be worth the consideration of those responsible for the proof standard.

THE hitherto unknown dimethyl arsine, $(CH_3)_2AsH$, has been isolated by Dr. Palmer in the laboratory of the University of Illinois, and is described by him in the current *Berichte*. It was obtained by the reduction of cacodyl chloride. The most advantageous mode of preparing it is as follows:—Granulated zinc is first slightly platinised, then covered with absolute alcohol, and sufficient hydrochloric acid added to produce a rapid current of hydrogen. A mixture of cacodyl chloride, hydrochloric acid, and alcohol is then allowed to fall into the flask from a dropping funnel; a reaction immediately commences, and copious vapours of the reduction product are carried away by the escaping excess of hydrogen. The vapours are conducted first through water contained in a couple of U-tubes, then dried by passage through a calcium chloride tube, and eventually led into a suitable receiver immersed in a freezing mixture of ice and salt. The dimethyl arsine rapidly condenses in the receiver to a colourless mobile liquid which boils at 36°. It is endowed with the characteristic cacodylic odour, and spontaneously inflames with some violence in contact with the air. When air is admitted to the mixture of its vapour with hydrogen a dense white cloud is produced, which rapidly settles upon the walls of the vessel in the form of a crystalline deposit, which is very soluble in water. Dimethyl arsine is completely absorbed by silver nitrate from the mixture of its vapour with hydrogen, with formation of a precipitate of metallic silver and an acid substance which appears to be cacodylic acid. The reaction which occurs in its preparation may be represented by the equation:

$$(CH_3)_2AsCl + H_2 = (CH_3)_2AsH + HCl.$$

If the cacodyl chloride is allowed to enter the reaction vessel too rapidly, or if there is an insufficient supply of acid present, the chief product of the reaction is cacodyl itself, $(CH_3)_4As_2$. Owing to the high boiling point of cacodyl, however, it is either retained entirely in the reaction vessel or in the washing tubes, so that the purity of the escaping dimethyl arsine is not appreciably affected, although its amount is considerably diminished. Dr. Palmer expects shortly to have a further communication to make concerning the remaining unknown organo-arsenic compound, monomethyl arsine, CH_3AsH_2, experiments being now in progress with a view to its isolation.

THE additions to the Zoological Society's Gardens during the past week include a Black-headed Lemur (*Lemur brunneus*, ♂) from Madagascar, presented by the Hon. Mrs. Fellowes; a Green Monkey (*Cercopithecus callitrichus*, ♀) from West Africa, presented by Mrs. Flowers; a Leonine Monkey (*Macacus leoninus*, ♂) from Burmah, presented by Mr. J. W. Hunter; a Brown Capuchin (*Cebus fatuellus*, ♀) from Guiana, presented by Mrs. J. L. Johnson; a —— Mangabey (*Cercocebus*, sp. inc. ♂) from Ujiji, Lake Tanganyika, a Yellow Baboon (*Cynocephalus babouin*, ♀), a Duyker-bok (*Cephalophus mergens*,

♀), an Æthiopian Wart Hog (*Phacochœrus æthiopicus*, ♂), a Banded Ichneumon (*Herpestes fasciatus*), a Milky Eagle Owl (*Bubo lacteus*), a Black-crested Eagle (*Lophoaëtus occipitalis*), a Marabou Stork, (*Leptoptilus crumeniferus*), two Green-necked Touracous (*Corythaix chlorochlamys*), two White-crested Touracous (*Corythaix albo-cristatus*), a Bell's Cinixys (*Cinixys belliana*) from British Central Africa, presented by Mr. H. H. Johnston; a Black-faced Kangaroo (*Macropus melanops*, ♂) from Australia, presented by Dr. G. Lindsay Johnson; a Black-headed Conure (*Conurus nanday*) from Paraguay, presented by Mr. A. Harrison; a Golden Eagle (*Aquila chrysaëtos*) from Scotland, presented by the Maclaine of Lochbine; a Stump-tailed Lizard (*Trachydosaurus rugosus*) from Australia, presented by Capt. Jamieson; a Maholi Galago (*Galago maholi*) from South Africa, an Arabian Gazelle (*Gazella arabica*, ♂) from Arabia, an Indian Gazelle (*Gazella bennetti*, ♀) from Persia, a Lioness (*Felis leo*) from East Africa, a Military Macaw (*Ara militaris*) from South America, deposited; a White-tailed Gnu (*Connochætes gnu*), three Ypecaha Rails (*Aramides ypecaha*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

THE NATIVE CALENDAR OF CENTRAL AMERICA AND MEXICO.—The native races of Mexico and Central America used a calendar differing completely from those employed by the ancient nations of the Old World to reckon time. Many explanations of the origin of the calendar have been suggested, some referring it to series of recurring events in nature, others to astronomical phenomena, while a third section of inquirers regard it as purely mythical and terrestrial. Dr. D. G. Brinton has lately studied the peculiar calendar from the point of view of linguistics and symbolism, and his results are given in the *Proceedings* of the American Philosophical Society, vol. xxxi. p. 258, 1893. As the calendar system investigated is not widely known on this side of the Atlantic, it may be well to give an outline of it. "The basis is a so called 'month' of twenty days. Each day is designated by a name of some object, animate or inanimate, and besides its name, each day is numbered, but not from one to twenty, but only from one to thirteen, when the numbering begins again at the unit. The result of this combination evidently is, that a day bearing both the same name and the same number will not recur until thirteen of the 'months' have elapsed. This gives a period or cycle of 260 days, and this anomalous period is at the foundation of the native calendar." Dr. Brinton's linguistic analysis of the names of the twenty days in the Maya, Tzental, and Quiche-Cakchiquel dialects, and in the Zapotec and Nahuatl languages, shows that they are all identical in signification, and therefore must have had one and the same origin. By arranging the symbols represented by the day-names in order from one to twenty, it is found that they exhibit a sequence covering the career of human life, from the time of birth until death at an old age. Thus, in all the five languages and dialects, the name of the first day signified birth or beginning, that of the tenth day, success (through hardship and suffering); of the eleventh, difficulties surmounted; of the thirteenth, advancing years; of the eighteenth, war and death; of the twentieth, the sun, or house of the soul. It appears, therefore, that the calendar conveyed a philosophical conception of life; which may or may not, however, have originated contemporaneously with it. The period of twenty days was doubtless derived from the vigesimal system of counting in use among the tribes employing the calendar. This number 20 is based on finger-and-toe counting, and Dr. Brinton points out that in the languages investigated its name has the signification "completed" or "filled up." "In this way," he thinks, "the number came to represent symbolically the whole of man, his complete nature and destiny, and mystically to shadow forth and embody all the unseen potenesis which make or mar his fortunes and his life." Each of the twenty signs in the primitive calendar had 13 numbers, and also 13 names, or rather 13 varieties of the same name. Apparently the ancient seers of Mexico and Central America believed that by assigning thirteen modes of activity to each of the twenty headings under which the agencies that influence human life were arranged, they had taken into account the thirteen possible relations of each to both the material and immaterial worlds; and the fact that the result of 20 × 13 days is 260 days or approximately nine months, that is, the period from conception to birth, would, according to Dr. Brinton, have appeared to confirm the mystic potenesis of these cardinal numbers. But whatever theory is accepted to account for the adoption of the factor 13, there is little doubt that this period was posterior and secondary to the 20 day period.

THE APPEARANCE OF THE HELIUM LINE.—M. A. Bélopolsky contributes to the *Memorie della Società degli Spettroscopisti Italiani* for May an account of some observations made by him on the apparent reversal of the Helium line, D_3. He noticed, while observing solar prominences, that this bright line frequently appeared double and contained a dark line, not running down its middle, but nearer to one edge than the other. A close investigation on several occasions showed that the one-sided appearance was not produced by instrumental defects. And since it was found that the line was sometimes visible, while at other times it could not be detected, M. Bélopolsky concluded that it was produced by absorption in the earth's atmosphere. The fact that the line did not split D_3 in halves, and that a second similar line could sometimes be seen, indicated that the appearance was not merely one of reversal. To locate the positions of these dark lines, the third order of a spectrum produced by a Rowland grating having 14,438 lines to the inch was employed. It was then found that the bright badge of Helium was almost exactly in the middle of two fine lines, of which the one near the redward side was double. Their telluric origin was evidenced by their absence on one occasion when the air was very dry and the temperature – 4° C. At other times, when the atmosphere was full of moisture, and the temperature comparatively high, the lines were perfectly seen. With a spectroscope of small dispersive power, the double line on the red edge of D_3 appears as a single line stronger than the really single line on the violet side, which can only be seen under good observing conditions. M. Bélopolsky gives the following wave-lengths of the lines, on the Potsdam scale: 587·65 (double), 587·60 (D_3), 587·58.

EPHEMERIS FOR TEMPEL'S COMET.—In continuation of the ephemeris for Tempel's periodic comet, given in these columns on May 31, the following ephemeris for Paris Midnight (from *Astr. Nach.* 3229) shows the positions of the comet until the middle of August:—

1894.	R.A. h. m. s.	Decl. ° ′
July 1	2 16 48	3 15
5	2 26 5	3 34
9	2 35 2	3 50
13	2 43 39	4 3
17	2 51 55	4 14
29	3 14 34	4 30
Aug. 2	3 21 20	4 29
6	3 27 41	4 26
10	3 33 36	4 21
14	3 39 4	4 13

The comet is in Cetus, and is moving towards Taurus. It will pass about a degree to the north of α Ceti in the middle of July.

THE RECENT DISCOVERY OF FOSSIL REMAINS AT LAKE CALLABONNA, SOUTH AUSTRALIA.[1]

II.

GEOLOGY.

FOR what I have to say under this head I must express my obligations to my colleague, Prof. Tate, whose observations in Australia have now extended over many years. He has recently summarised the whole history of its geological progress in a very able presidential address to the Australasian Association for the Advancement of Science, and I have had no hesitation in quoting freely from this and from other writings of so competent an observer.

There appears to be no doubt, both from geological and

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[1] By Dr. E. C. Stirling, F.R.S., C.M.G., Hon. Director, South Australian Museum. (Continued from page 183.)